

# APPENDIX 7

## REVIEW OF THE REASONABLE AND FORESEEABLE DEVELOPMENT

A Reasonable Foreseeable Development (RFD) is developed to forecast future activity and, in the case of oil and gas development, includes boom and bust cycles. The RFD does not imply any drilling restrictions or limitations but is simply a forecast of anticipated activity. The actual number of wells drilled per year varies from year-to-year. The accompanying tables and charts illustrate both the forecasted cycle as well as the actual cycle of activity in the oilfield. A review of the actual cycle of activity against what was forecast indicates the original RFD is still valid, and the actual activity level has not exceeded what was forecast.

A discussion of the geology of the Permian Basin and oil and gas activity of the general area is cited by reference (see Oil and gas in the New Mexico part of the Permian Basin, R.F. Broadhead and S.W. Speer, New Mexico Geological Society Guidebook, 44<sup>th</sup> Field Conference, Carlsbad Region, New Mexico and West Texas, 1993.)

In preparing the Special Status Species RMP Amendment/EIS, the original RFD, as it projects oil and gas development, needed to be reviewed. The original RFD can be found in Appendix 18 of the 1994 Draft Roswell RMP/Carlsbad RMPA.

The assumptions and guidelines for impact analysis for oil and gas development stated:

The RFD projections for the Carlsbad and Roswell Field Offices (Tables A18-1 and A18-2) in the 1994 Draft Roswell RMP/Carlsbad RMPA contain estimates of the number of wells drilled and the resulting acres of disturbance over a 20-year period.

The development of the RFD is based on the following assumptions and information.

1. Oil and gas activity would occur in accordance with continuing management guidance.
2. Oil and gas leasing laws and regulations would not change substantially over the next 20 years.
3. New leasing and/or development is based on RFD projections.
4. Based on historical drilling trends, there will be a “boom” period of increased drilling followed by a decrease in exploration and development, sometime in the life of the plan.

The RFD projections are based on an analysis of potential development. The following information was used in this analysis:

1. Areas available for leasing and development.
2. The potential for oil and gas occurrence (potential for occurrence does not imply or refer to the likelihood of development, extraction, or economic favorability).
3. Existing oil and gas practices.
4. Existing leases and related industry exploration and development activities.

Based on actual well counts by year, at least 47,811 wells have been drilled between the years 1904 and 1991 in southeastern New Mexico. The bulk of these wells were drilled after 1920.

The RFD projections are concerned with the total number of oil and gas wells, access roads, pipelines, and power lines projected to be developed during the next 20 years in the Pecos District. The RFD projection for the next 20 years represents projected disturbed acreage and well numbers including one "Boom-and Bust" cycle. The projected total number of wells was determined by using historical well data. Historical well data was obtained from New Mexico Oil Conservation Division (NMOCD) and BLM records. Total projected wells include wells from all categories of mineral estate ownership, unless otherwise indicated.

The RFD projections consist of Federal wells regardless of surface management or ownership. In determining the Federal portion of the RFD projections, percentages of wells by ownership category (i.e., Federal, State, fee) was used. The total number of wells forecast was multiplied by the percentage identified for Federal wells to obtain the projected number of Federal wells. Normal spacing for oil wells is 40 acres, 160 acres for shallow gas wells, and 320 acres for deep gas wells.

To provide a basis for the analysis of the cumulative impacts of oil & gas development and exploration, it is also necessary to review actions anticipated on private lands within the oil fields. Anticipated oil field development activities could affect federal acres within the developed oil fields. The following summation is an aggregate of disturbance resulting from activity on both Federal and private lands unless indicated otherwise. Many of the affected acres on private lands have already been disturbed by historic oil field operations.

Developmental wells average 503 oil, 203 gas, and 28 injection wells completed per year. Of these, an average of 382 oil, 162 gas and 21 injection wells are new completions.

During the 20-year analysis period, about 94 producing wells per year would be abandoned. This would result in the reclamation of about 1.5 of the 4.9 acres per well that are currently occupied by production facilities.

The following is a summary of wells drilled during the period of 1975-1992. This summary includes oil, gas, and plugged and abandoned (P&A) wells. These numbers include wells in all ownership categories (Federal, State, and fee) unless indicated otherwise.

In the Pecos District, there were 14,544 new well completions during the 18 years between 1975 and 1992 period. This is an average of 808 new well completions per year for the district. During this same period, 2,641 or 18 percent of these new well completions were plug and abandoned (P&A), an average of 147 P&A wells per year. Based on past-drilling history in the Roswell District, 39.5 percent of wells drilled were on Federal lands.

The RFD in Appendix 18 goes on to separate the Field Offices.

#### Roswell Field Office

In the Roswell Field Office, 3,318 of the wells drilled in the Pecos District were drilled as new well completions during the 18-year period, an average of 184 new well completions per year. During this same time frame, 951 or 29 percent of new well completions were P&A. This is an average of 53 P&A wells per year. Based on past drilling history in the Roswell Resource Area, 40 percent of wells drilled were on Federal land.

#### Carlsbad Field Office

In the Carlsbad Field Office, 11,226 wells were drilled as new well completions during the 1975-1992 period, for an average of 624

new well completions per year. During this same period, 1,688 or 15 percent of these new well completions were P&A, an average of 94 P&A wells per year. Based on past drilling history in the Carlsbad Field Office, 39 percent of wells drilled were on Federal land.

Based on the history of wells drilled in southeast New Mexico, The RFD projected an average of 319 federal wells to be drilled per year and an average of 58 wells per year to be P&A on Federal minerals. Those projected numbers for Roswell Field Office are 74 wells drilled per year and 21 wells P&A on Federal minerals. Those projected numbers for Carlsbad Field Office are 243 wells drilled per year and 37 P&A wells per year. The difference in the total of two wells drilled per year can be attributed to rounding differences.

To check the projected activity within the Pecos District, BLM collected well data from the New Mexico Oil Conservation Division (OCD). OCD records show that from 1993 to 2004 8,911 wells were drilled on all ownerships for an average of 743 wells per year. Within the Roswell Field Office 602 wells were drilled (50 wells per year) and 8,309 wells were drilled in the Carlsbad Field Office (692 wells per year). Federal wells during this period totaled 3,520 wells for an average of 293 wells per year within the District. Federal wells within Roswell Field Office totaled 240 wells for an average of 20 wells per year and the figures for Carlsbad Field Office are 3,240 wells total with an average of 270 wells per year. Over the past 12 years the average number of Federal wells drilled per year (290) is well within the projected annual average (319), therefore, the RFD projections are still valid.

The next task was to determine the amount of drilling activity within the Planning Area. Based on OCD actual well data and past RFD work, the Planning Area contains about 18 percent of all wells in the entire district. Using the 30-year average of all wells drilled in southeast New Mexico (782), we can estimate that approximately 141 wells will be drilled within the Planning Area. Using the average percentage of federal wells drilled per year (43 percent), it is estimated that of those 141 wells per year, 61 of them will be drilled for Federal minerals within the Planning Area. Based on the 30-year average percentage of federal wells drilled per year in the Roswell Field Office and Carlsbad Field Office, we can estimate that approximately 10 of the 61 wells will be drilled in the Roswell Field Office and 51 will be drilled in the Carlsbad Field Office per year.

Using the 30-year average of all wells plugged in southeast New Mexico (62), an estimated 11 wells will be plugged within the Planning Area. Using the average percentage of Federal wells plugged per year (43 percent), BLM can estimate that of those 11 wells plugged per year, 5 of them will be on Federal land, one in Roswell Field Office and 4 in Carlsbad Field Office.

Calculating the average number of wells drilled per year flattens the boom and bust cycles. As stated previously in this appendix, the RFD is a forecast of the future. This forecast is used in the analyses of impacts and is not used as a threshold for development scenarios. The forecast of 61 wells drilled per year in the Planning Area is expected to be exceeded in some years and not attained in others. The same is to be expected for the average number of wells per year to be plugged and abandoned.

TABLE AP7-1 PROJECTED OIL AND GAS WELLS						
	TOTAL WELLS*	AVERAGE WELLS PER YEAR	PERCENTAGE OF WELLS IN THE PLANNING AREA	PLANNING AREA WELLS PER YEAR	PERCENTAGE OF FEDERAL WELLS	FEDERAL WELLS PER YEAR (RFO/CFO)
1975-1992	14,544	808	18	145	43	62 (10/52)
1993-2004	8,911	743	18	134	43	58 (9/49)
Total	23,455	782	18	141	43	61 (10/51)
SOURCE: Pecos District Office Files, 2006.						
NOTE:*Data from New Mexico Oil Conservation Division						

### Surface Disturbance from Oil and Gas Development

The assumptions for surface disturbance from access roads, drill pads, pipelines, power lines, and seismic activity were originally published in Appendix 18 of the Draft Roswell RMP/Carlsbad RMPA. Some of the values reflect values for exploration and development in new areas. Much of the Planning Area is within or near well-developed fields. Exploration and development of resources in well-developed areas reduces the distance required for roads, pipelines, and power lines. The surface disturbance assumptions were modified to estimate impacts associated with oil and gas exploration and development drilling activities in developed areas.

- Stabilization of surface disturbance is expected to occur within 3 years.
- Access Roads: 14 foot-wide travel way, 1.5 acres disturbance per access road, .75 acre disturbance stabilized per access road per well.
- Drill Pads: 1.4 acres disturbance per average well pad (250 feet x 250 feet), 1.0 acre stabilized per abandoned well.
- Pipelines: 1.6 acres initial disturbance per producing well (30 feet right-of-way width), .75 acres stabilized per

producing well, 0.5 acres stabilized per abandoned producing well.

- Power lines: .5 acre initial disturbance per producing well, 0.25 acres stabilized per well.
- Statistics on drilling activity and surface disturbance assumptions were used to project acres of disturbance, stabilization, and net long-term disturbance for the planning area. Disturbance estimates are based on the most probable future projection of drilling activity on Federal land for the next 20 years.
- Approximately one acre is disturbed per mile of geophysical line. In the Roswell Field Office, approximately 150 miles of new geophysical lines are anticipated per year. In the Carlsbad Field Office, approximately 700 miles of new geophysical lines are anticipated per year. Reclamation of disturbance is expected to occur within 3 to 5 years.
- An average of 5 acres per well was used to determine surface disturbance in Chapter 4 discussions and are shown in Table AP7-5. This is a total acreage value and includes surface disturbance from roads, pipelines, power lines and other activities associated with exploration and development of oil and gas resources.

FEDERAL DRILLING ACTIVITY SINCE THE RFD WAS DEVELOPED  
FOR THE 1994 DRAFT RMP/RMPA/EIS

TABLE AP7 -2 ROSWELL FIELD OFFICE DRILLING ACTIVITY				
YEAR	APDs RECEIVED	APDs APPROVED	ACTUAL WELLS DRILLED	RFD* #'S
1992	N/A	N/A		
1993	36		12	35
1994	37		21	46
1995	28		11	38
1996	40		11	52
1997	43	22	26	64
1998	27	23	12	91
1999	27	23	10	161
2000	44	32	24	252
2001	61	56	31	132
2002	40	58	19	98
2003	67	65	45	76
2004	81	60	12	41
<b>AVERAGE</b>	<b>44</b>	<b>42</b>	<b>20</b>	<b>91</b>

SOURCE: Pecos District Office Files, 2006.  
NOTE: \*Reasonable and foreseeable development projection

**FIGURE AP7 -1 ROSWELL FIELD OFFICE DRILLING ACTIVITY**

**TABLE AP7-4  
PECOS DISTRICT DRILLING ACTIVITY**

<b>TABLE AP7-3 CARLSBAD FIELD OFFICE DRILLING ACTIVITY</b>				
<b>YEAR</b>	<b>APDs RECEIVED</b>	<b>APDs APPROVED</b>	<b>ACTUAL WELLS DRILLED</b>	<b>RFD #S</b>
1992				
1993	812		188	213
1994	675		383	194
1995	600		391	228
1996	753		547	243
1997	773	512	503	254
1998	546	495	299	320
1999	363	327	215	337
2000	656	489	377	314
2001	592	564	364	267
2002	419	448	264	296
2003	577	557	353	322
2004	493	571	290	230
AVERAGE	605	495	348	268

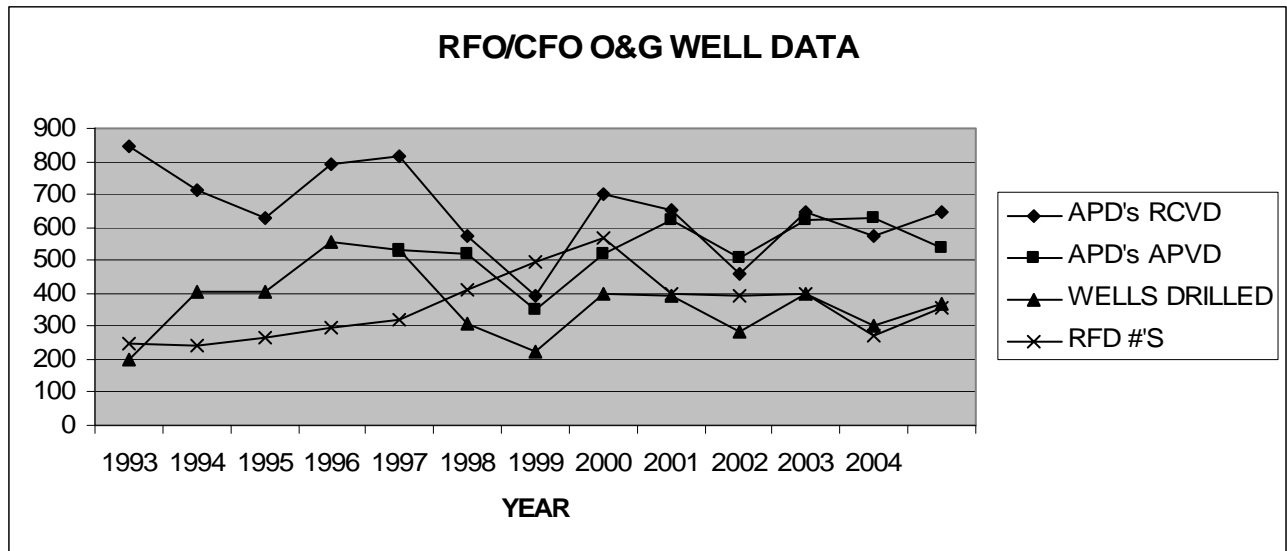
SOURCE: Pecos District Office Files, 2006.

**FIGURE 7-2 CARLSBAD FIELD OFFICE DRILLING ACTIVITY**

<b>YEAR</b>	<b>APD's RECEIVED</b>	<b>APD's APPROVED</b>	<b>ACTUAL WELLS DRILLED</b>	<b>TOTAL RFD #'s</b>
1992		N/A	N/A	N/A
1993	848	N/A	200	248
1994	712	N/A	404	240
1995	628	N/A	402	266
1996	793	N/A	558	295
1997	816	534	529	318
1998	573	518	311	411
1999	390	350	225	498
2000	700	521	401	566
2001	653	620	395	399
2002	459	506	283	394
2003	644	622	398	398
2004	574	631	302	271
AVERAGE	649	538	367	359

SOURCE: Pecos District Office Files, 2006.

**FIGURE 7-3 PECOS DISTRICT DRILLING ACTIVITY**



**TABLE A7-5 SURFACE DISTURBANCE FROM OIL AND GAS DEVELOPMENT**

	<b>ESTIMATED NUMBER OF WELLS DRILLED PER YEAR</b>	<b>ESTIMATED NUMBER OF WELLS PLUGGED AND ABANDONED PER YEAR</b>	<b>NUMBER OF ACRES DISTURBED PER YEAR</b>	<b>NUMBER OF ACRES RECLAIMED AND STABILIZED PER YEAR</b>	<b>NUMBER OF ACRES RECLAIMED FROM P&amp;A WELLS PER YEAR</b>	<b>ESTIMATED NUMBER OF WELLS DRILLED OVER 20 YEARS</b>	<b>ESTIMATED NUMBER OF WELLS PLUGGED AND ABANDONED OVER 20 YEARS</b>	<b>NUMBER OF ACRES DISTURBED OVER 20 YEARS</b>	<b>NUMBER OF ACRES RECLAIMED AND STABILIZED OVER 20 YEARS</b>	<b>NUMBER OF ACRES RECLAIMED FROM P&amp;A WELLS OVER 20 YEARS</b>
No Action Alternative	61	11	305	140	18	1,220	220	6,100	2,806	360
Alternative A	51	11	255	117	18	1,020	220	5,100	2,346	360
Alternative B	49	11	245	113	18	980	220	4,900	2,254	360
Alternative C	49	11	245	113	18	980	220	4,900	2,254	360
Alternative D	54	11	270	124	18	1,080	220	5,400	2,484	360
Alternative E (5 years)	32	11	160	74	18	160	55	800	368	90

SOURCE: Pecos District Office Files, 2006.